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Implementing The Tracking Network

breakout ABSTRACT

Abstract No. 47

TITLE

SPATIAL ANALYTIC MODELING OF THE HEALTH EFFECTS OF TRAFFIC EMISSIONS

TRACK

Network Content

OBJECTIVES

Participants will be able to become more informed regarding the issues of spatial correlation in analytic models and how to assess its influence on results which is essential in examining geographic-based hazards and outcomes.

SUMMARY

Introduction: Asthma and preterm birth have been consistently associated with geographic and temporal variations in traffic related pollution, three phenomena for which geographic data may commonly be assembled and analyzed by EPHT programs. For both social and environmental reasons, data for each of these phenomena are spatially structured. How this structure is incorporated into statistical models influences conclusions about the effects of traffic related pollution on health outcomes.

Methods: We assembled vital records data on 19,535 singleton births and administrative data for 712,505 enrollees in a private managed care organization and fee-for-service Medicaid in Alameda County for the year 2001. For each of these subjects we calculated traffic pollution exposure metrics based on their geocoded address of residence; for this example, we will consider (a) the number of vehicles per day passing within a 300-meter radius, and (b) the ground-level concentration of NO2 based on land-use regression modeling. Associations were calculated using standard logistic regression, which assumes that all spatial structure is accounted for by the variables included in the model, and a semi-parametric estimator model allowing residual variation to retain its own structure.

Results and conclusions: Although health outcomes were consistently associated with traffic exposure metrics, the size and significance of these associations vary depending on the analytic method used. The spatial structure of residuals (autocorrelation) can be considered as arising from spatially distributed but unmeasured covariates in the model. Analytical procedures accounting for this structure are more theoretically rigorous and are becoming more accessible to public health practitioners.

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